

ATOMIC ENERGY

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Dear Sir:

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In an effort to apply atomic energy directly to national defense of the U.S., an accelerated and concerted effort is now to be made by Knolls Atomic Power Laboratory, West Milton, N.Y., to develop a single purpose nuclear reactor designed specifically to produce large amounts of heat under conditions that will enable it to be used for generating power for submarines and ships. All work on the pilot version of an atomic central-station power plant, which has been underway at Knolls for some time, has been stopped. While both the new and the superseded reactors are in the intermediate region of neutron energies, the breeding possibilities in this region, which were to have been explored by the cancelled reactor, and which will not be explored by the new project, are to be investigated at Arco, at the reactor testing station. Other objectives of this original Knolls project, besides exploring breeding possibilities, and generating heat for a stationary power plant, were to develop fuel elements capable of high specific power and high burn-up, and develop and test possibilities of a coolant system employing a liquid metal different from that used in any other nuclear reactor. Estimates are that from two-thirds to three-fourths of the research and development work already done on the original project will find use in the new ship and submarine reactor.

Less than 5% of the manpower, existing in fields related to the study of thermonuclear reactions as in the hydrogen bomb, are now assigned to the task, according to Dr. Edward C. Teller, assistant director for weapons research at Los Alamos Scientific Laboratories. Dr. Alvin C. Graves, who is deputy commander for the forthcoming Eniwetok nuclear weapons experiments, said recently that his work at Los Alamos was related to both atomic and hydrogen bombs; he warned against complacency regarding such weapons, and said such an attitude could result in loss of World War III.

Facilities being set up at Eniwetok Atoll, for the evaluation tests to be held there shortly of new nuclear weapons, and for preliminary experiments which will be conducted in connection with thermonuclear reactions, for hydrogen bomb development, were inspected last week by Lt. Gen. E. R. Quesada, Dr. Graves (above), and his staff. The tests are expected to involve more than 10,000 military and civilian personnel.

An atomic research project, knitting together both the physical and social sciences, entirely without the help of Federal funds, is the objective of the University of Michigan. Dr. Alexander G. Ruthven, University of Michigan president, who is attempting to raise \$6,500,000.00 to construct and support the project at the University, told of his aims last week in New York. He said it would be little short of disastrous should the direction of research into the peacetime applications of atomic energy be given into government control or domination.

AT THE ATOMIC CITIES & CENTERS IN THE UNITED STATES...

OAK RIDGE, Tennessee- To utilize to their fullest extent the increased uranium-235 producing capabilities of the new K-29 and K-31 uranium-235 production units (now under construction here), equipment changes are to be made in sections of one of the original uranium-235 plants (K-27). Selected stages of K-27 are to be revised, to increase their capacity, so that the material may be passed through at a faster rate. It will be an \$800,000.00 job; new impellers will be installed, with higher horse-power motors. (At K-29 and K-31, last week, approximately 600 general laborers walked out. They asked Maxon Construction Co., who are doing the work, for a higher wage, mainly because Oak Ridge's acute housing shortage makes it necessary for most construction workers to come from Knoxville.)

A pilot plant is to be set up here to investigate a new and cheaper method of making barrier. It is anticipated that the new barrier will also show an improvement in mechanical properties over the standard material which has been made here for the last year and a half. Cost of the pilot plant will approximate \$80,000.00, with an additional \$5,000.00 for special instruments for these barrier manufacturing studies. Studies are also underway here for a processing method to reclaim the nickel and uranium from used barrier tubes. A processing plant, or its equivalent, to cost \$40,000.00, is planned for the immediate future.

RICHLAND, Washington- Concentration of process waste here, by evaporation, will be attempted as a means of reducing the volume of by-product wastes from the plutonium separation processes at Hanford Works. Concentrating equipment, to cost \$500,000.00, will enable the work to be done on a production scale basis. Pilot plant work at Oak Ridge had shown the practicability of the method that will be used. Behind this new evaporation approach is the serious problem of disposal of the several types of radioactive wastes from plutonium separation processes here, which have been sent to tank storage since the beginning of operations. The tanks provided originally were fully occupied by these wastes in 1948, and several additional tank farms were erected. Now, the accelerated plutonium production rate makes still more waste storage facilities necessary. The sum of \$2,700,000.00 will be spent in fiscal 1951 for new waste storage tanks. Even so, a much larger installation would have been required, were it not for the evaporative attack to reduce waste volume by concentration, and the disposal of supernates and less noxious materials into ground cribs and tile fields. The magnitude of the problem is shown by the total of \$3,653,000.00 which will be spent at Hanford in fiscal 1951 on the over-all waste storage and disposal projects.

LOS ALAMOS, New Mexico- A group of 31 reinforced concrete buildings, the main structure of which is to be one story, of about 22,000 square feet of floor space, are to be constructed here. Bids have been invited by the AEC here under invitation 291-50-89; closing date is June 15th. In two phases, the approximate cost of construction of phase A is \$1 $\frac{1}{2}$ / $\frac{2}{3}$ million; of phase B, \$1/ $\frac{1}{3}$ million. Kistner, Curtis & Wright, of Los Angeles are handling architect-engineer work... To house and furnish necessary equipment for a series of capillary air washers and filters, bids have now been asked, by the AEC here, under invitation 291-50-80; closing date is May 18th. Ralph M. Parsons & Co. are architect-engineers on this \$400/800,000.00 (est.) job.

ARCO, Idaho-The materials testing reactor, to be erected here by the Fluor Corp., Ltd., is now under test at Oak Ridge where a full scale mechanical mock-up of the basic reactor structure was constructed. This mock-up includes reactor tank, simulated fuel and reflector assemblies, control rod mechanisms, and coolant circulating system. Now, fabrication techniques for the fuel assemblies have been nearly perfected, and fabrication techniques for the reflector are under development. The test holes, for the insertion of test samples and full scale component assemblies, which will be provided in various parts of the reactor to supply differing radiation conditions, have been tentatively designed. Engineering tests are underway to determine the adequacy of cooling, the reliability of fuel handling, and reactor assembly and disassembly manipulations.

NEW PRODUCTS, PROCESSES & INSTRUMENTS...for nuclear work...

A new beta gauge, for continuous measurement of weight per unit area, was shown last week for the first time by Pratt & Whitney division of Miles-Bemont-Pond, at the Philadelphia convention of the American Society of Tool Engineers. Strontium-90 (half-life, 25 years) is used as standard equipment in the instrument. The manufacturer suggests uses by the paper, leather, rubber, textile, and metal industries for continuous measurement of moving sheets of material.

Successful operation in its first phase of a non-ferromagnetic synchrotron, which is ultimately expected to produce energies of 300 Mev, was announced last week by General Electric Co. The new machine is being built by G-E under the joint sponsorship of the Office of Naval Research, and the G-E Research Laboratory.

With the need to remove, from discharged wastes, the air-dispersed radioactive end products of nuclear processes, interest attaches to the U. S. Technical Conference on Air Pollution, to be held May 3-5, in Washington, D.C. About 80 papers will cover virtually all phases of air pollution. Among the seven panel discussion groups scheduled for the conference, at the panel on equipment, of which A. E. Gorman, AEC, is the chairman, a symposium will be devoted to the theory and practice of removing aerosols by filters. "Dry Fibrous Filters", will be discussed by E. Stafford and W. Smith of Arthur D. Little, Inc., Cambridge; "Viscous Impingement Filters" will be treated by J. May, American Air Filter Co., Louisville; "Bag Filters" will be discussed by R. Pring, of American Wheelabrator Corp., Mishawaka, Ind.; and "Filter Beds", will be covered by Dr. L. Silverman, Harvard School of Public Health. At another session, A. B. Ray, Carbide & Carbon Chemical Corp., N. Y., will discuss solid sorbents for the control of atmospheric pollution.

MANUFACTURERS NOTES- Under arrangements that have now been set up, the 24 Mev betatron, manufactured by Allis-Chalmers Manufacturing Co., Milwaukee, will be distributed and serviced by the Picker X-Ray Corp., New York. (This betatron is specifically designed for deep radiation medical therapy.

Low background flow counter, model D46A, of improved construction which, it is said, has resulted in improved sensitivity and some lowering of operating voltage. Flush time between sample of ten seconds. Resolution time, approximately 100 microseconds. A sample as large as 1½-in. in diameter may be used. Starting potential, 1025-volts; plateau, 400 volts long, with a slope of less than 3% per hundred volts.--Nuclear Instrument & Chemical Corp., Chicago, Ill.

Probing Geiger-Muller counter tubes, designed for use in neurological surgery. Applicable to other medical and biophysical uses requiring a probe of minimum size. Stainless-steel probing needle, with outside diameter of 2 mm. Wall thickness, approximately 65mg/sq. cm. Needle length, 10 cm.--Ballantine Laboratories, Inc., Boonton, N. J.

BOOKS & OTHER PUBLICATIONS...in the nuclear field...

A special collection of guides which may be helpful to the radioactive ore prospector in various sections of the world:

UNITED STATES-Prospecting for Uranium.--Superintendent of Documents, Washington, D. C. (30¢)...Radioactive Uranium & Thorium.--Arizona Bureau of Mines, Tucson, Arizona, (5¢).

CANADA- Prospector's Guide for Uranium & Thorium Minerals in Canada.--Bureau of Mines, Department of Mines & Resources, Ottawa...The Search for Uranium, by W. S. Savage.--Ontario Department of Mines, Toronto...Notes on Prospecting for Uranium in Canada, by A. H. Lang.--Department of Mines & Resources, Ottawa.

UNITED KINGDOM- A Prospector's Handbook to Radioactive Mineral Deposits. -His Majesty's Stationery Office, London, England. (6 d.)

AUSTRALIA- Pamphlet No. 3: Radioactive Mineral Deposits. (Notes for the guidance of prospectors in Australia.) - Department of Supply & Development, Bureau of Mineral Resources, Canberra.

BRITISH WEST AFRICA- Prospecting for Uranium & Thorium in Nigeria. -The Government Printer, Kaduna, Nigeria.

RAW MATERIALS...radioactive ores & other essentials for nuclear work...

UNITED STATES- The Colorado Plateau area was recently described by Phillip L. Merritt, of the AEC's Raw Materials Operations Office, as the most important uranium-producing region in the United States. He said other areas of primary and secondary mineralization, such as the Colorado Front Range, the newly discovered deposits in the Sunshine Mine in Idaho (AEN 10/11/49, p.5), the Marysville, Utah area (AEN 1/31/50, p. 5), and the Upper Peninsula of Michigan (AEN 1/3/50, p. 5), show promise for future production. Merritt said evaluation has been substantially completed of potential low-grade uranium ores such as the phosphate rocks of Florida and the northwestern states, and the black shales of Tennessee and Kentucky.

CANADA- Eldorado Mining and Refining (1944) Ltd., the Canadian government owned uranium ore producer, is actively working on its extensive holdings acquired at Beaverlodge Lake, just north of Lake Athabaska, in northern Saskatchewan, according to W. J. Bennett, Eldorado president. An extensive program of lateral exploration will be carried out at the Ace and Eagle shafts, now being cut, to gain some positive idea of the ore's potentialities. Now, at the Ace shaft, sinking has reached a depth of approximately 400-feet, on the incline. At the Eagle shaft, approximately five miles northwest of the Ace, a vertical depth of approximately 280-feet has been reached.

INDIA- A plant to process the monazite sands in India is to be set up at Alway, in the United State of Travancore and Cochin. Authorized capital for the proposed plant will be \$1,050,000.00, and the working capital \$210,000.00. The Indian government would contribute \$787,000.00, and the rest would be contributed by the Government of Travancore-Cochin. (Monazite sands from Travancore average nearly 10% thorium, compared to those from Brazil which average less than 2.5% thorium. In 1949, 2,500 tons of Brazilian monazite sands were said to have been exported to the U. S. --AEN, 4/11/50. The Indian exports of monazite, during the five years up to 1940, averaged 4,000-tons annually, which, with 10% thorium, would mean 360 tons of thorium).

ATOMIC PATENT DIGEST...latest U.S. & British Applications & grants...

Method of eliminating spurious counts by Geiger-Muller counter tube, by applying sufficient heat to the cathode of the tube to reduce the internal tube impedance substantially and in an amount less than results in substantial cathode thermal electron emission. U.S. Pat. No. 2,502,331, issued Mar. 28th, 1950; assigned to Radio Corp. of America.

Self-quenching Geiger-Muller counter containing oxygen, nitrogen, xenon, and argon in such proportions that their partial pressures in mm. of mercury are as follows when the total gas pressure is about 740 mm. of mercury: Oxygen- trace to 30; nitrogen- trace to 30; xenon- at least $\frac{1}{2}$; argon- balance. U. S. Pat. No. 2,503,302, issued April 11th, 1950; assigned to Radiation Counter Laboratories, Inc., Chicago.

Vacuum leak detector method, with mass spectrometer. Directing a stream of probe gas against the exterior surface of the vacuum system under test, and determining the presence of a leak in the system by the indication of the presence of the probe gas in the mass spectrometer. (The evacuated chamber of the mass spectrometer is connected to the evacuated portion of the vacuum system under test, which is separately evacuated.) U.S. Pat. No. 2,504,530, issued Apr. 18th, 1950; assigned by mesne patent, to United States of America (USAEC).

Cyclotron target for use in the production of radioisotopes of elements selected from the group having the atomic numbers 51 through 54, and 80 through 83, by bombardment with high-velocity sub-atomic particles. The target comprises a heat-conductive base, on which is a relatively thin, adherent layer of a thallium telluride. U. S. Pat. No. 2,504,585, issued Apr. 18th, 1950; assigned to United States of America (USAEC).

Method of producing beryllium oxide of high purity. Comprises reacting ammonium sulfate with ammonium beryllium fluoride by heating this mixture to about 500 degrees C., with the resulting production of beryllium sulfate and evolution of ammonium fluoride. U. S. Pat. No. 2,504,696, issued Apr. 18th, 1950; assigned to Beryllium Corp., Reading, Pa.

IONIZING RADIATION...investigations & notes...

A new sorting process for beryllium minerals, using nuclear emission, has been devised by A. Gaudin, J. Dasher, J. Pannell, and W. Freyberger, at the Minerals Engineering Laboratory, Massachusetts Institute of Technology, Watertown, Mass. The process depends on the emission of neutrons by the beryllium, upon its irradiation by gamma rays. In the method, pieces of beryllium ore, on a moving belt, are bombarded with an intense beam of gamma rays. Those pieces which are rich in beryllium minerals emit neutrons at a sufficiently high rate to detect that emission and use it to actuate a mechanical device for removing the active from the barren particles. Pieces of beryl as small as one g. were picked with certainty at rates approaching 5 per second.

Folic acid was found not to have any influence on lethal radiation illness in swine, in experiments by E. P. Cronkite, J. L. Tullis, C. Tessmer, and F. W. Ullrich, at the Naval Medical Research Center, Bethesda, Md. In the work, eight swine were exposed to 400 r total body irradiation. Four were treated with intramuscular injections of 45 mg. of folic acid per day. The clinical and hematological courses were observed, and post-mortem examinations were performed. No differences were observed in the responses of the treated and untreated swine.

Exposure of mice to whole body x-irradiation, with or without lead protection of the spleen, with observations on the regeneration of the hematopoietic tissues, has been the subject of an investigation by L. O. Jacobson, E. L. Simmons, W. F. Bethard, E. K. Marks, and M. J. Robson, of Argonne National Laboratory, Chicago, and the Institute of Radiobiology and Biophysics, of the University of Chicago. In the experiment, young adult female mice were exposed to 1025 r whole body x-irradiation. The spleens of these mice were mobilized surgically, through an abdominal incision, and lead protected during irradiation in one group, and mobilized but not lead protected during irradiation in another group. In the animals without lead protection of the spleen, the bone marrow and lymphatic tissues were destroyed, and no regeneration was as yet apparent on the 10th day after irradiation. In the animals with lead protection of the spleen during irradiation, these tissues were never depleted of free hematopoietic cells, and the bone marrow and the lymph nodes were normal in cellularity by the eighth day after irradiation.

RADIOISOTOPES...as used for therapy & tracer applications...

Using radiophosphorous autographs, studies have been made of the mineralization of the growing tooth, in hamsters, by L. F. Belanger and C. P. Le Blond, Dept. of Histology, University of Ottawa, and Dept. of Anatomy, McGill University. An injection of carrier-free radiophosphorous (P-32) was given to the hamsters soon after the appearance of dentin, and examined in the germs of the 1st and 2nd molars. An analysis of the findings has led the experimenters to conclude that dentin grows by continuous apposition of layers of insoluble phosphate in the area close to the odontoblasts.

Radioactive iron (Fe-55) has been used in studies of excretion of iron by the skin of dogs; the work was done at the School of Medicine and Dentistry, University of Rochester, by W.B. Stewart, R.T. Snowman, C.L. Yuile, and G.H. Whipple. Following intravenous or oral administration of single doses of the radioiron to dogs, no significant amounts of iron were found to be excreted through the skin in one to seven days.

To demonstrate the depression of the erythroid portion of the bone marrow by total body x-irradiation, radioactive iron (Fe-59) has been used by T.H. Hennessy, and R. L. Huff, of the Donner Laboratory, University of California, Berkeley, in a series of experiments with rats. The radioactive iron red cell uptake curve was found to be a sensitive indicator of x-irradiation damage to the bone marrow. Results also showed that the greatest depression in erythroid marrow activity occurs at a period of about one day after irradiation.

Sincerely,

The Staff,
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